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Feature Article - Measuring Price change in the Australian Economy

INTRODUCTION

The ABS currently publishes a range of broad-based price indexes, which vary in both their coverage and conceptual basis. Some relate to particular segments of the economy (such as consumer, producer and international trade price indexes), while others encompass the whole of the economy (such as those published with the annual and quarterly Australian national accounts).

The most commonly used index for the analysis of inflation is the consumer price index (CPI). However, national accounts chain price indexes and implicit price deflators (IPDs), which have a broader coverage than the CPI, have certain advantages over the CPI for some analyses.

This article discusses the conceptual basis of price indexes, and then compares the CPI and some of the national accounts measures. It concludes that price movements in the national accounts measures are generally similar to those in the CPI, and that the few major differences observed since 1998 are primarily due to the different conceptual bases. It also concludes that when measuring price change affecting the household sector, the CPI and the chain price index for household final consumption expenditure (HFCE) should be preferred to the IPD for HFCE.

THE CONCEPTUAL BASIS OF PRICE INDEXES

The compilation of price indexes involves aggregating price changes relating to many different classes of goods and services. The various component price changes have to be weighted together according to their relative importance. Indexes published by the ABS are generally fixed weighted, although IPDs are current weighted price indexes.

In simplistic terms, for a common group of prices, all three types of price index (i.e. fixed weighted indexes, chain indexes and IPDs) only differ by the weights used to aggregate them. The CPI uses five yearly weights to compile its time series (i.e. price movements are weighted together quarterly using a single base year set of weights, in five yearly spans). An annually chained price index weights price changes together using the previous year's weights for every quarter. On the other hand an IPD weights price change together using the current period's (either quarterly or annual) weight, hence the term 'current weighted'. All three measures will produce different rates of price change over a given time span.

Fixed weighted price indexes, as their name implies, combine the various component price

changes using weights which do not change(Footnote: Fixed weighted price indexes are known as Laspeyres indexes.). These weights are based on the relative importance, in a particular base period, of expenditures on the various classes of goods and services which are in the scope of a particular price index. The weights remain fixed for at least one year and, in the case of the CPI, up to five years. Adjustments are made so that changes in prices resulting from changes in quality are not reflected in the price of items. Such indexes measure the change in the cost of purchasing an identical basket of goods and services from one period to another, and are often described as measuring 'pure price change'.

The use of fixed weights over an extended period of time is not a sound index construction practice. Hence for ABS price indexes, weights are updated periodically to take account of changes in expenditure patterns. To assist economic analysis, series with different weighting patterns are chained (or linked) together to form a continuous time series. For more information on chain indexes, see **Introduction of Chain Volume Measures in the Australian National Accounts** (cat. no. 5248.0).

Current weighted price indexes combine the various component price changes using expenditure information for each period. Differences in index numbers may reflect both price and quantity changes. This feature can be an advantage for certain types of analyses. For example, in analyses of export and import prices, where significant compositional change can occur over time, it may be desirable to take account of the relative activity underlying the prices actually received or paid in a period, rather than aggregating prices based on the fixed activity weights of some previous period. This is particularly so when the relationship between prices and incomes is being explored, such as with terms of trade analysis. The national accounts IPDs are current weighted price indexes.

THE CONSUMER PRICE INDEX (CPI)

The CPI has been specifically designed as a general measure of price inflation for the household sector as a whole. It measures the change over time in the price of a basket of goods and services which account for a high proportion of expenditure by metropolitan private households. The term 'metropolitan' refers to the six state capital cities, Darwin and Canberra.

The CPI basket of goods and services is divided into 11 major groups: Food; Alcohol and tobacco; Clothing and footwear; Housing; Household furnishings, supplies and services; Health; Transportation; Communication; Recreation; Education; and Miscellaneous. These groups are divided into 34 subgroups, and the subgroups into 89 expenditure classes.

The weights applied to these expenditure classes are based on a survey of household expenditures. Weighting patterns are changed at approximately five-yearly intervals to take account of changes in household spending patterns. When the expenditure weights are updated, the new index is linked to the previous one. The linking factor is the ratio, in the link period, between two sets of aggregate prices. These aggregates are derived from weighting patterns based respectively on the old and new baskets. In a linked series, price movements are measured on the basis of one weighting pattern up to the time of the link and on another weighting pattern from the link. This ensures that the impact of new weights does not raise or lower the level of the index. The CPI now comprises fourteen series of price indexes which have been linked together to form a continuous series.

The CPI aims to measure the change in the cost of purchasing a fixed basket of goods and services over time, and as such, must price identical or equivalent items in successive periods. However products do change, and as the characteristics of products are altered, adjustments are made to exclude the effects of any change in the quality or quantity/size of the goods or services.

The CPI is available in original terms only. The ABS has undertaken periodic research into identifying seasonality in the CPI, most recently in October 2003. The conclusion reached in that study was that the All Groups CPI does not have any stable seasonal pattern, although some of the individual groups are seasonal.

NATIONAL ACCOUNTS CHAIN PRICE INDEXES

Chain price indexes are published for all expenditure aggregates except changes in inventories. A chain price index for any particular aggregate is obtained by first weighting together elemental price indexes(Footnote: Elemental price indexes in the CPI are unweighted indexes constructed from price data.) from the previous financial year to the current financial year, where the weights are calculated using expenditure shares of the previous financial year. Second, the resulting aggregate year-to-year price indexes are chained (or linked) together to form a time series. Third, the time series is referenced to 100.0 in the reference year, currently 2001-02.

The chain price index most akin to the consumer price index is the index for household final consumption expenditure. Differences in scope and coverage are discussed later in this article. Chain price indexes are available in original terms only. They are subject to revision as the expenditure weights are generally revised as firmer data become available.

NATIONAL ACCOUNTS IMPLICIT PRICE DEFLATORS (IPD)

An implicit price deflator (IPD) is an index obtained by dividing a current price value by its corresponding volume estimate. Thus IPDs are derived measures (hence the term 'implicit') and are not direct measures of price change.

In effect, an IPD reflects the weighting together of price movements using weights of the current period(Footnote: Technically, IPDs are Paasche price indexes.). For example, the 2001-02 to 2002-03 IPD movement is calculated by aggregating the 2002-03 over 2001-02 price movements with 2002-03 volume weights. Similarly, for quarterly data, the June quarter 2003 to September quarter 2003 movement is obtained by aggregating the September quarter 2003 price movements with September 2003 volume weights. Under this approach, changes between any two periods are a combination of changes in price and changes in the weights used to aggregate the time series, (the latter is commonly referred to as compositional shift), in each of the two periods concerned.

It is possible for changes in the item mix of the relevant aggregate to produce an increase in the IPD between two non-base periods when all component prices have decreased or, conversely, for a decrease in the deflator to occur when all component prices have increased. While these may be extreme cases, from time to time significant aberrations do occur, e.g. when a major purchase of a capital good is made by the private sector from the public sector, the IPD for public

gross fixed capital formation can be negative.

Much of the quarter-to-quarter change in the item mix of aggregates is seasonal. A seasonally adjusted IPD is derived by dividing a seasonally adjusted current price value by its corresponding seasonally adjusted volume measure. The seasonal adjustment process is undertaken at the component level and separately for current price and volume series. The seasonal patterns displayed by the current price and volume series for any particular component may differ, in which case the derived seasonally adjusted IPD itself will exhibit some seasonality. An IPD derived from seasonally adjusted quarterly data is normally a more reliable indicator of price change than one calculated from unadjusted data.

In cases where there is compositional shift or some seasonality in component prices, differences may emerge between seasonally adjusted IPDs and unadjusted measures, such as the CPI and chain price indexes. Since September quarter 1998, the average difference between the HFCE chain price index and the HFCE seasonally adjusted IPD has been 0.22 percentage points, with the largest difference in the March quarter 2004 of 0.8 percentage points.

Finally, users should be aware that IPDs are subject to revision because of revisions to the relevant current price and/or volume estimates, including changes to seasonally adjusted estimates resulting from seasonal reanalysis.

THE CPI COMPARED WITH IPDS AND CHAIN PRICE INDEXES FOR NATIONAL ACCOUNTS AGGREGATES

The broadest measures of price change in the economy are the IPDs and chain price indexes for domestic final demand and gross domestic product, which are published in table 2 of this publication. However, the analysis in this article focuses on the CPI (as it is the most commonly used index for the analysis of inflation) and the national accounts chain price index and IPD for household final consumption expenditure. These three indexes have broadly similar expenditure coverage.

Movements in the chain price index for HFCE are generally close to movements in the CPI due to the fact that much of the CPI is used in the construction of the HFCE chain price index. However, differences do occur between the two price indexes in some quarters. Some of the more important reasons for these differences are:

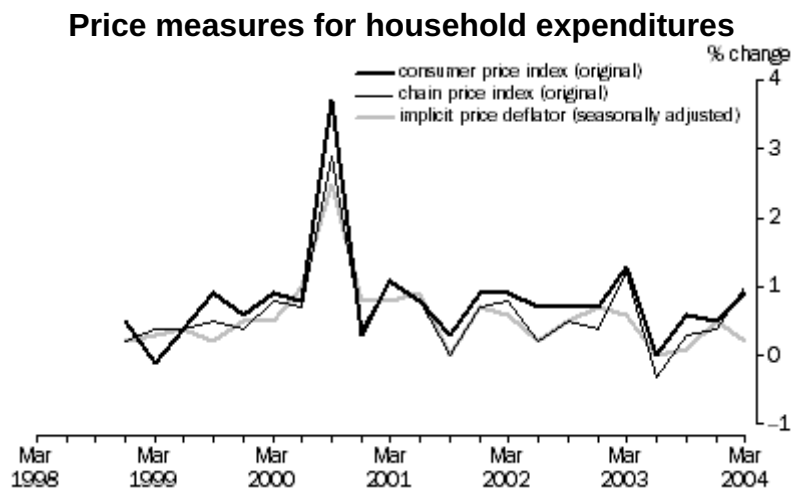
- HFCE is broader in scope and relates to expenditure by all Australian resident households in Australia and overseas and private non-profit institutions serving households whereas the CPI relates to expenditures by Australian resident households in the eight capital cities of the states and territories
- HFCE has broader coverage. The major goods and services included in HFCE, but not in the CPI, are expenditure on gambling and a range of financial services, such as bank charges (both direct and indirect), the costs of life insurance offices and superannuation funds, and share brokering commissions
- HFCE and the CPI differ conceptually for certain items. For example, HFCE excludes expenditure by persons on the purchase and maintenance of dwellings, but imputes rental payments for owner-occupied dwellings. The CPI represents home ownership costs by actual rents, net house purchase (new dwellings excluding land plus alterations and additions), property rates and charges, house repairs and maintenance and house

insurance. There are also differences in the treatment of certain government rebates, health care costs and insurance costs

- The HFCE chain price index is reweighted every year whereas the CPI is reweighted at approximately five yearly intervals with timing generally linked to the availability of detailed household expenditure survey data.

The conceptual and coverage differences mentioned above, together with the different base periods of the chain price index and the CPI, result in different weights being applied in each index to similar components.

The graph below shows the movements in the chain price index and the IPD (in seasonally adjusted terms) for household final consumption expenditure and the CPI between December quarter 1998 and March quarter 2004. This period was selected for analysis because the conceptual basis and coverage of the CPI was changed significantly from the September quarter 1998. For more information, see **Outcome of the 13th series Australian Consumer Price Index Review** (cat. no. 6453.0).



Since September quarter 1998, the average difference in quarter on previous quarter movement (without regard to sign) between the CPI and the chain price index has been 0.23 percentage points, and 0.35 percentage points between the CPI and the IPD. Differences from the CPI in individual quarters have been as high as 0.8 percentage points for the chain price index and 1.2 percentage points for the IPD.

Four quarters in which large differences occurred between the CPI and the chain price index are March quarter 1999 (0.5 percentage points), September quarter 1999 (0.4 percentage points), September quarter 2000 (0.8 percentage points) and June quarter 2002 (0.5 percentage points).

In the March quarter 1999, the CPI was particularly affected by the Federal Government's 30% rebate on private health insurance (effective from 1 January 1999). The rebate was included in the CPI as it affected the price actually paid by consumers, but excluded from HFCE as it is treated as a social assistance benefit in cash (and is therefore included in the household income account). Health insurance premiums are also treated differently in the two price measures; the CPI measures the actual change in premiums while the national accounts measures identify the insurance service charge. Excluding the effect of the Health and Personal Care group from the CPI, the March quarter 1999 movement becomes 0.4%, which is identical to the chain price

index movement.

The other three periods are particularly affected by Housing (in particular house purchase) and automotive fuel. As described above, the conceptual basis for housing in the CPI and national accounts is different. Hence a large increase in the 'house purchase' expenditure class of the CPI, as was seen in those three quarters, will not be reflected in HFCE. Automotive fuel is included in both indexes. However, the weight attached to automotive fuel in the CPI is significantly higher than its weight in HFCE (because of the generally broader coverage of HFCE compared to the CPI). Hence, a large increase in the price of automotive fuel, as evidenced in those three quarters, would lead to a relatively higher increase in the CPI.

CONCLUSION

Quarter to quarter movements in the CPI compared with chain price indexes and IPDs for HFCE are fairly similar over time, but significant differences can occur in particular quarters. On the whole these differences can be explained by the different conceptual bases of the indexes. In general, for short-term analysis of price change, the choice of index formula (fixed-weighted or current-weighted) has limited effect. However, the consumer price index and the chain price index for HFCE are considered the most suitable indexes for measuring price change, as the effects of compositional change are excluded from these indexes whereas IPDs are affected by compositional change.

FURTHER INFORMATION

Further information on this article may be obtained by contacting Michael Anderson on (02) 6252 6713 or by email at michael.anderson@abs.gov.au, and on the consumer price index by contacting Steve Whennan on (02) 6252 6251 or by email at steve.whennan@abs.gov.au.

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